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MENON, KRISHNAN S	

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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/806,416
Filing Date: March 23, 2004
Appellant(s): HIROKAWA ET AL.

Yan Lan
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 8/18/08 appealing from the Office action mailed 1/29/08.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct. Even though appellant has not identified the independent claim, there is only one independent claim, and the citation of the page and paragraph numbers of the specification is with respect to that claim.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is substantially correct. The changes are as follows:

Claims 1-5 were rejected under 35 USC 103(a) as being unpatentable over two references individually, or in combination; and not WO 02/051528 in view of Schmidt. The correct language of rejection was:

Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 02/051528, and/or Schmidt (US 6,352,641).

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

US 6,352,641	SCHMIDT	MARCH 2002
US 6,702,941	HAQ	MARCH 2004
WO 02/051528	DE LA CRUZ	JULY 2002

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 02/051528, and/or Schmidt (US 6,352,641).

WO teaches low pressure drop spiral wound modules for applications such as reverse osmosis or ultrafiltration as claimed – see example 5. The first permeate side passage material in this reference is integral with the separation membrane (membrane is coated on it. See abstract). The second permeate side passage material, which is wrapped around the core tube, is ***separated*** from the first permeate side passage material, as in claim 5. The core tube has perforations. The example 5 of WO teaches

using feed spacer material to wrap around the core tube; therefore, it is the “second permeation-side passage material” as claimed. (Please note that the term ‘feed spacer material’ or ‘second permeate side passage material’ are only names of the material used; the material used as the ‘second permeate side passage material’ in this reference is normally used as a feed space material). The feed-side passage material and the first permeation side passage material are disposed respectively on the feed side and permeation side of the separation membrane.

Schmidt teaches a spiral wound element as seen in the figures and column 1 lines 8-38. Figure 2 of Schmidt also shows multiple wraps of the permeate spacer material around the core as claimed – the first and second permeate-side passage material is the same, or monolithic.

The references do not specifically teach the limitation:

> the effective perforated-part area as calculated by multiplying the total area of the perforations in the perforated cored tube by the percentage of openings in one layer of the second permeation-side passage material is at least 1.0 time the inner cross-sectional area of the core tube.

However, this limitation can be optimized for lowest pressure-drop for fluid flow through the perforations and the winding of the permeate side passage material around the core without compromising the strength of the core tube. Since the % opening is given for a specified permeate side passage material (such as the feed spacer used in the WO reference), the number and size of openings of the perforations of the core tube

can be varied by design. More openings and larger openings for the perforations would weaken the permeate core tube. Fewer and smaller openings would reduce the flow path and increase pressure drop. Thus it is a result-effective variable, which can be optimized. Discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art. In re Boesch and Slaney, 205 USPQ 215 (CCPA 1980); In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977); “[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.” In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

The above limitation is also commonly used in designing perforated tubes or cores, as seen in the reference Haq et al (US 6,702,941) (column 26, lines 34-55, which teaches that perforated area should be at lest equal to the cross-sectional area of the inlet tube to avoid perforations restricting the flow). See the excerpts from the cited part of the reference Haq and the annotated fig 4:

> to flow along the gap. In order to prevent the perforations from acting as a flow restriction during dead end filtration, the total area of the perforations **71** is preferably at least as large as the cross-sectional area of the portions of the upper end face of the filter pack **20** through which process fluid can flow into the filter pack **20** from the process fluid chamber **55** (which does not include the cross-sectional area sealed off by the sealing strip **24** at the upper end of the filter pack **20**).

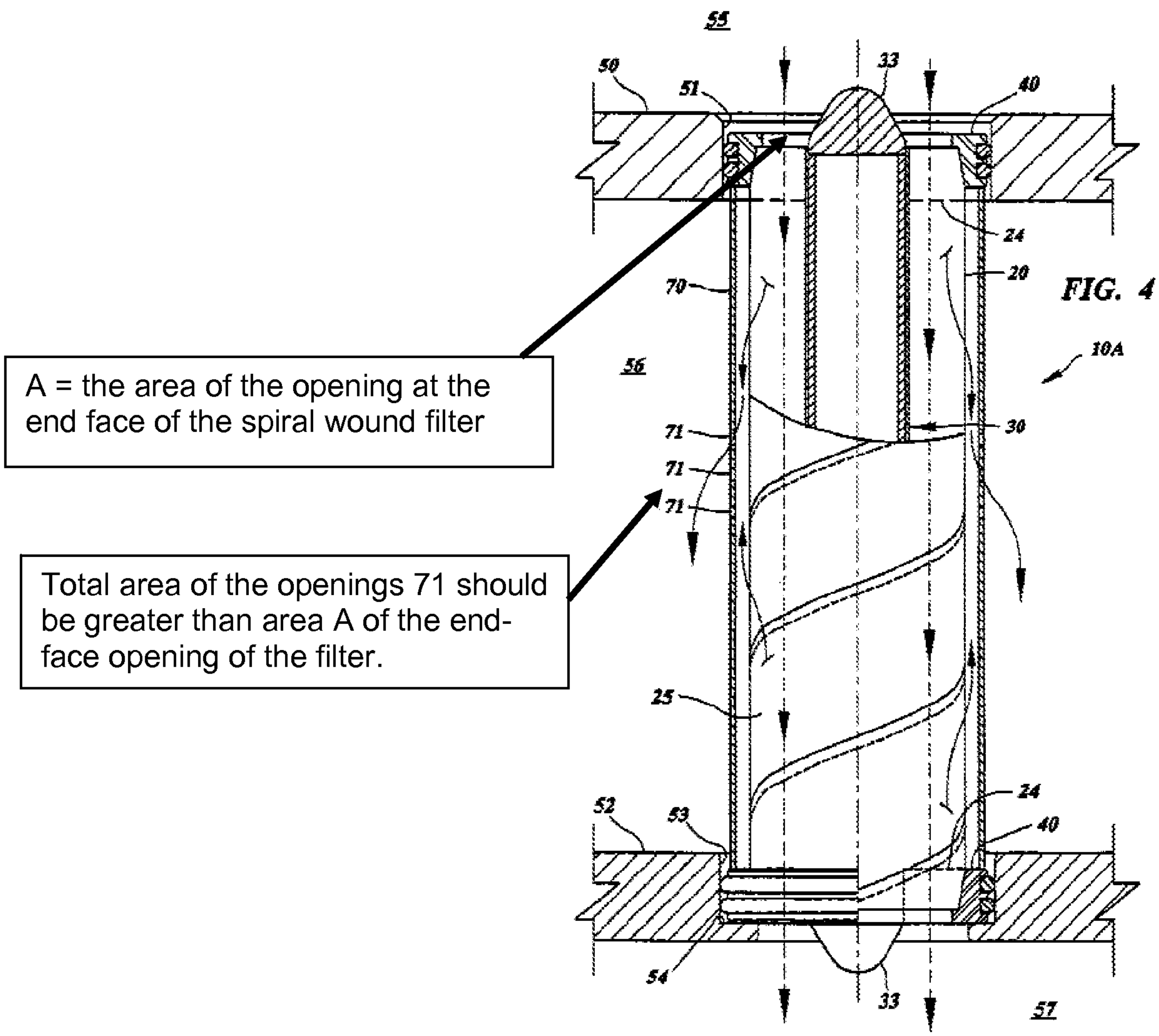

Figure 4 of Haq reproduced above is annotated to show how the perforations (71) are designed. The area of the perforations (71) should be at least equal to the area of the filter end-face so that the perforations do not create flow restriction. This is true in the case of the spiral wound membrane elements of the teachings of the references WO and Schmidt. Since the references do not have any specific guidelines as to how to decide upon the open (or, effective) area of the perforations (perforations are partially covered by the wraps of spacer material around the tube), one would resort

to standard engineering practice to design this area and related literature such as the guide lines as shown in the Haq reference.

(10) Response to Argument

For purpose of clarity, the fig 1 of the Schmidt reference is reproduced below, with annotations showing how it meets limitations of claim 1:

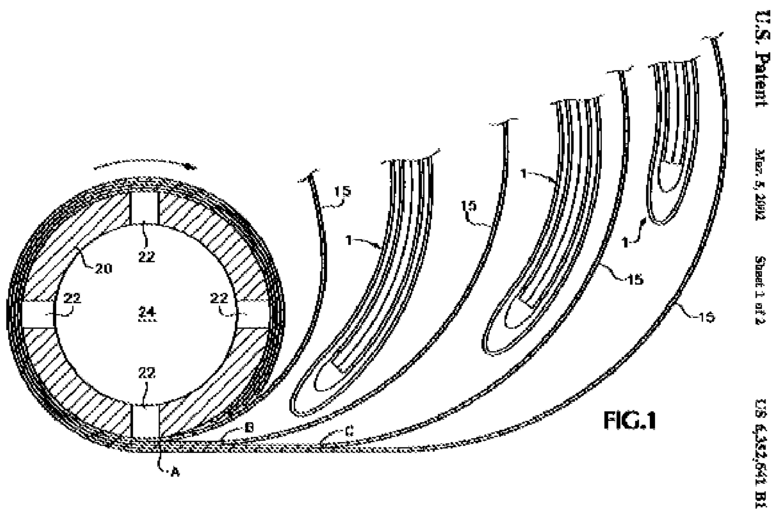

Fig.1 of the Schmidt reference showing a spiral separation membrane element having perforated core tube (24) with plurality of perforations (22), separation membrane (1), feed side passage material (not numbered, but inside the fold of membrane (1)), permeate side passage material (15), second permeate side passage material (marked A,B,C) spirally wound around the tube, which is the same as the first permeate side passage material (15) as in claim 4, and the feed side and the permeate side passage materials are respectively disposed on the feed and permeate sides of the membrane. The reference does not teach the effective perforated area as at least the cross-sectional area of the core tube.

Appellant's arguments are directed at this effective perforated area. Arguments are:

None of the cited reference discloses or suggests the recitation of the effective perforated-part area as calculated by multiplying the total area of the perforations in the perforated cored tube by the percentage of openings in one layer of the second permeation-side passage material is at least 1.0 time the inner cross-sectional area of the core tube, as recited in claim 1.

Appellants respectfully submit that Haq does not calculate the effective perforated-part area by multiplying the total area of the perforations in the perforated cored tube by the percentage of openings in one layer of the second permeation-side passage material. ,

and that none of the cited references identify the *effective perforated area* as a result-effective variable.

Well, the rejection points out two different reasons why this limitation does not make the claims patentable: (1) the effective area of perforations on the tube is a result-effective variable, even if WO or Schmidt do not identify it as such, and Haq does not state this explicitly. Haq does teach appropriately designing this area to prevent it from restricting flow. Secondly, one of ordinary skill in the art would easily recognize this as a result-effective variable, as clearly explained in the rejection. (2) This is also a common design practice, as is shown with the Haq example, and also by the following discussion, a part of which was at presented to the appellant in prior office actions:

There are multitudes of references that teach spiral wound membranes with permeate tube wherein the permeate spacer is wrapped around the permeate tube at least one round, and wherein the permeate tubes have perforations or slots to carry permeate into the tube. However, none of the references specifically state the size of the tube, the length of the tube, the number and sizes of the perforations, or the percent openings of the permeate spacers, because, such design variables are within the

capabilities of one of ordinary skill to design. Even if the references do not teach what is claimed in the exact terms, applicant's claims do not have anything novel in them; the % opening through the permeate spacer wrap and the perforations taken together in series would be far more that the cross-sectional area of the permeate tube. It is also a common engineering practice to provide the area of perforations of a perforated distribution/collection tube as significantly greater than the cross-sectional area of the tube so that the perforations do not create undue flow resistance (as evidenced by the Haq reference).

Claim recites that the effective area of the openings of the perforations should be greater than the cross-sectional area of the core tube. In the references WO and Schmidt, as in with applicant's invention, the variable that can be varied is the perforations – number and size of the perforations. This is because the second permeation side passage material and the core tube are already set or fixed.

The structural part associated with this claim limitation forms part of the permeate flow-path from the spiral membrane element. The permeate flow path includes (1) the first permeate side passage material, (2) the second permeate side passage material, (3) the perforations of the core tube, and (4) the core tube. One of ordinary skill in the art, therefore, would decide on the number and size of the perforations, so that perforations covered with what-ever number of wraps of the second permeation side passage material around the core tube would not restrict permeate flow. Standard engineering practice tells us that the best way to ascertain this would be to have the total open (or, uncovered/unobstructed) area of perforations be greater than the core

tube cross-sectional area, as well as the cross-sectional area of the permeate flow passage in the permeate side passage materials. Therefore, this claim limitation would not make the appellant's claims patentable.

The Examiner submits that, as is with multitudes of commercially available spiral membrane elements, the WO and the Schmidt elements also would have this ‘effective perforations area' far greater that the cross-sectional area of the core tube. Appellant has not provided any evidence to show otherwise.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner’s answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Krishnan S Menon/
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/Duane S. Smith/

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/Gregory L Mills/

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